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APPLICATION OF ARTIFICIAL INTELLIGENCE IN LIBRARIES FOR PROMOTING LIFELONG LEARNING IN HIGHER EDUCATION FOR SUSTAINABLE DEVELOPMENT IN KANO STATE NIGERIA

By

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Abstract

Purpose. *The paper examines the application of Artificial Intelligence in providing Library' Services for promoting lifelong learning in higher education.*

Methodology *Mixed research methodology is used while a survey research design was employed for the study, with 700 population and 313 sample size of respondents. The questionnaire was used in data collection and interviews for library staff.*

Findings. *Findings indicate that library used artificial intelligence to provide services such as user instruction program which is the most utilized service for effective learning (With 89%) and selective dissemination of information 70%, while lending services 50%.*

Originality/value;

Implication: *This lies in it's recommendation that the use of artificial intelligence for learning should be enhanced and regular seminars and workshops for user education in order to support lifelong learning are needed for sustainable development in Kano state.*

Keywords; Libraries; Artificial Intelligence; Lifelong learning; Libraries; Higher Education; Sustainable Development Nigeria.

Introduction

Artificial intelligence enhances the ability of libraries to ensure the integrity and authenticity of their digital collections. By using AI-powered tools, libraries can automatically detect and correct errors or inconsistencies in digital files, ensuring that the content remains intact and trustworthy. AI algorithms can also be used to monitor files for signs of corruption or degradation, enabling libraries to take preventive actions before the damage becomes irreversible (Zhou, 2019). AI can analyze large datasets and provide more accurate search results by understanding user queries better than traditional keyword-based search engines. AI-powered systems can also offer personalized recommendations, improving access to digital resources (Huang, 2020).

The integration of AI in digital preservation has significantly impacted

libraries by streamlining processes, improving accuracy, and ensuring that digital collections remain accessible and reliable over time. AI-powered tools enable libraries to automate routine preservation tasks, forecast future needs, and enhance user access to digital resources, positioning them to better manage their digital collections in the evolving technological landscape Artificial Intelligence (AI) has significantly enhanced the user experience in libraries by offering personalized services, improving search capabilities, and increasing accessibility. AI's ability to process and analyze large volumes of data allows libraries to offer more tailored and efficient services to their users, improving overall satisfaction and Engagement. Apart from the normal and usual literacy programs provided to users that promote lifelong learning. Today the application of artificial intelligence improve the function of libraries which in one way or the other would support the sustainable development in higher institution of Kano state and Nigeria at large.

Statement of the problem

Artificial intelligence is one of the new technologies adopted by libraries for providing effective library services to users. Libraries become primary users of this application because of its ability to supplied users with information. In spite its significance in higher education particularly in kano state there is abused of the application by students and other users of libraries, problems such as poor awareness, lack of technical knowhow and inability of the users to identify reliable information have become an issue especially with the students that are conducting research project. They access and submit information without proper checking and acknowledging the sources or where the software derived it sources. This warrant the researcher to conduct the study in order to identify the application, function, awareness, use and challenge of artificial intelligence in libraries of higher education of kano state.

Objectives of the Research

1. To examine the AI application used by libraries promoting lifelong learning in higher institution of kano state
2. To identify the level of awareness of AI in libraries for promoting lifelong learning
3. To identify the challenges of using AI application in libraries in promoting lifelong learning
4. To identify the measures taken to minimized the challenges

Research Questions

1. What are the types of artificial intelligence used by of libraries for promoting lifelong learning
2. What are the level of awareness of AI in libraries in promoting lifelong learning
3. What are the challenges of using artificial intelligence in promoting lifelong learning
4. What measures are taken to minimize the challenges

Literature Review

Artificial intelligence enables libraries to provide personalized recommendations to users based on their previous searches, borrowing history, and preferences. This mirrors the recommendation algorithms used by platforms like Netflix or Amazon, where users receive suggestions for materials they might be interested in. According to McDonald and Frank (2020), personalized services powered by AI not only improve the relevance of the resources presented to users but also increase their likelihood of engaging with the library more frequently.

1. Improved Search and Discovery

AI-powered search tools go beyond traditional keyword searches by incorporating natural language processing (NLP), which allows users to search more intuitively. These advanced search algorithms interpret user queries, understand context, and provide more accurate results. This enhances the ability of users to find relevant information without needing to be experts in library search techniques. As noted by Chowdhury (2021), AI-driven search engines can significantly reduce frustration among users, especially those who are unfamiliar with traditional library classification systems.

2. Virtual Assistants and Chatbots

AI-driven virtual assistants and chatbots are increasingly being used to support users by answering basic queries, guiding them through library resources, and helping them locate materials. These chatbots, available 24/7, enhance the accessibility of library services by providing instant support even when library staff are unavailable. Brunskill (2019) reports that users appreciate the convenience of chatbots, particularly for resolving simple issues quickly, which improves overall user satisfaction.

3. Increased Accessibility for Diverse Users

AI can enhance library accessibility for users with disabilities. For example, AI tools can convert text to speech, enabling visually impaired users to access a wider

range of resources. Additionally, AI-driven translation tools make it easier for non-native speakers to engage with library materials. This inclusivity is particularly valuable in academic and public libraries, which serve diverse populations. As argued by Roberts and Smith (2020), AI-driven solutions can democratize access to information, ensuring that all users, regardless of ability or language, can benefit from library resources.

4. *Efficient Resource Management and Customization*

AI can analyze user data to optimize the availability and management of resources, ensuring that frequently used materials are more accessible. This helps libraries anticipate user needs, plan resource acquisition, and manage collections more effectively. According to Verma (2021), AI-driven data analytics can offer insights into user behavior, enabling libraries to adjust their services based on user demand.

AI plays a vital role in enhancing user experience in libraries by offering personalized services, improving search and discovery processes, providing accessible solutions for diverse users, and automating routine services. The continuous integration of AI into library systems is likely to further improve how users interact with and benefit from library resource. Libraries applied Artificial intelligence to improve it function in digital era as discussed below.Adams (2017) highlight the following as the function of libraries in the digital era according to the following stages as follows;

Stage one

1. Advancing culture of innovation
2. Addressing societal challenges
3. Adaptive learning technologies

Collaborative learning approach

Stage two

1. Collaborative learning approach
2. Competition from alternatives avenues of discovery
3. Information visualization

Stage three

Increasing accessibility of research content
Embedding academic and re3search libraries in the curriculum
Marker spaces

Stage four

1. Prioritization of mobile content and delivery
2. Managing knowledge obsolesce
3. Mixed reality

Stage five

1. Proliferation of open educational resources
2. Marketing promoting library services
3. Virtual assistance

Stage six

1. Shift away from books
2. Rethinking the roles and skills of librarians
3. Wearable technology; He further mentioned that:

Libraries remain the gate keepers to rich typescript of information and knowledge. In the face of financial constraints open access is potential solution. And the used of artificial intelligent and the internet of things are poised to amplify the utility and reach of library services.

Teslim (2024) artificial intelligent in education has created new possibilities for facilitating lifelong learning particularly in the realm of distance education. Lifelong learning is defined as the continuous pursuit of knowledge throughout an individual life which gained prominence in the 21st century. Luckin et.al (2016) artificial intelligent offers the ability to provide tailor educational content to the individual need of learners, enabling a more customized learning experience. AI powered tools such as adaptive learning systems can assess a student's strength and weaknesses and provide personalized feedback, thus facilitating more effective learning (Kulik and Fletcher,2016).

Artificial intelligent in education also present challenges. The digital divide remain a significant issues as access to AI powered tools is often limited to those with reliable internet connection and advance digital literacy skills. (Selwya, 2021). Moreover, ethical concern surrounding artificial intelligence include issues of bias and fairness in AI algorithms are increasingly being raised. (Bris, 2018). Data privacy is another concern as AI systems often rely on large amount of personal data to function effectively (Chopra and Sharma 2021). Therefore, addressing these challenges is crucial to ensuring that AI can be used to promote lifelong learning in higher institution of Kano state equitably and effectively.

Methodology

The study adopted a mixed research methodology, while a survey research design was employed for the study, with 700 population and 313 sample size of respondents. The questionnaire was used in data collection from the users while interviews for the library staff. The case studies were selected base on the following criteria

1. The libraries that have E- facilities
2. The libraries that used AI facilities
3. The users or learners who are aware of the facilities

The interview focused on experience of both the librarians and users using Ai for lifelong learning and the benefit them drive. While challenges encountered is also part of the scope of the work.

Data from the case studies were analyzed using thematic analysis, which allowed for the identification of common themes related to the opportunities and challenges of artificial in promoting lifelong learning in higher institution of Kano state. Also for the quantitative data frequency and percentage were used to analyzed the data from the respondents

Findings

Findings from librarian who served as the participants of the study.

Question number 1.p1 to p13 indicated different types of artificial intelligence services for their users and this include

1. Access to Chat Gpt for academic writing
2. Access to electronic books and journals
3. Digital reference services
4. Selective dissemination
5. User instructive services
6. Access to audio and video collection

Question number 2: The participant were asked whether the users are aware of the artificial intelligence services in the library.

P1 to p9 stated that the users were aware of the various services provided by the libraries, while p10 t0 p13 mentioned that there is little awareness from the users.

Question number 3. They were asked about the level of utilization of the artificial intelligence services.

All the participant mentioned that there was moderate utilization of the artificial intelligence

services because they only used the services when writing assignment and there research project, while others come to use their services to update their phones applications.

Question number 4: Do you used such services to improve the literacy of users for lifelong learning?

P1 to p8 mentioned that their main objective was to use the facilities and improve the learning of students so that they can teach other students, while p9 to p13 stated that they were only concern about the utilization of the services and no other thing else.

Question number 5: What challenges they encountered while providing services in the library.

All the participants mentioned the inappropriate use of facilities. For example. most of the students copy and paste research project and presented same to their lectures, misuse of AI applications, poor patronage, poor networking in some morning hours,

Question 6: Ways of overcoming the challenges

All the participant mentioned that there should be;

1. Sustenance of good digital library services such as online public access catalog, provision of eBooks and e-journals, and different application that would help user's access information.
2. Provision of good internet facilities
3. Constant power supply
4. Users awareness about the existence of the services in the libraries
5. Organizing workshop, seminar that would improve users lifelong learning
6. Training on the proper usage of the AI applications
7. Good library management.

P13 stated that there should be adequate funding for the libraries and government should be committed to providing basic need and facilities required by the libraries.

Findings from the users of the library

The users were selected from the 13 libraries across the Kano state. They are selected on the basis of the school that have digital facilities in there libraries as mentioned in the research methodology.

Table 1: User Gender

Gender	No	Percentage
Male	101	31
Female	212	69
Total	**313**	**100**

The total number of students that participated in the study was 313 one hundred and one 101 are male while two hundred and twelve is 212 female this shows that majority are female students in the participating schools. And this further shows that the female has the largest number in most of the higher institutions of Kano state.

Table 2: awareness of the Artificial Intelligent Services in the library

Awareness about the library artificial intelligent services	No	Percentage
Aware	263	82
Not aware	50	18
Total	**313**	**100**

The above tables show that 263 participants were aware of the services which is about 82 percent, while 50 participants are not aware of the services in the libraries. The findings indicated that majority of the users were aware especially the women because they paid more concentration about their education

Table 3: Access to Artificial Intelligent Services

Access to digital services	No	Percentage
Within the library	251	80
Outside the library	43	13
Both	19	7
Total	**313**	**100**

The above tables shows that 251 users (80 percent) access the artificial intelligence services within the library 43 which represents 13 percent access the services outside the library while only 19 which is 7 percent access the services both within and outside the library. The findings shows that most of the users visit the library to access the services.

Table 4: Application of Artificial intelligent in the library

AI Application	No	Percentage
Yes	270	86
No	43	14
Total	**313**	**100**

The study shows that most of the libraries applied artificial intelligence in the library with 86% while only 14% said no. The findings indicated that the majority of the users are aware of the services in the libraries.

Table 5: Use of AI to improve lifelong learning

Use for lifelong learning	No	Percentage
For Research	10	3
For Assignment	101	33
For research project	152	49
Others	50	15
Total	**313**	**100**

The findings shows that the use of artificial intelligent in research project was 49% and those that use to write assignment was 33%, and only 3% use it for research only. The study indicated that those that use artificial intelligent to write research project has the highest percentage because it retrieve information to areas whether relevant or irrelevant.

Table 6: How do you access the Artificial Intelligent in the Libraries?

Ways of accessing AI	No	Percentage
Through computers	203	64
Through cellphone	101	32
Others	10	4
Total	**313**	**100**

The study indicated the ways of accessing artificial intelligent is through computers which is 64%, and access through cellphone is 32% and others is 4%. The findings indicated that majority of the users access the services through computers.

Table 7: How frequent do you use the services

Frequency of using the services	No	Percentage
Every week	283	90
Every month	20	6

Every semester	10	4
Total	**313**	**100**

They indicated that 90% used the services every week, and only 6% use the services every month and 4% every semester. This shows that the users were using the services every week which has the highest percentage.

Table 8: What are the challenges encountered while using artificial intelligent application in the libraries

Challenges	No	Percentage
Unfiltered information	52	16
Too much information	53	16
Irrelevant information	100	31
Overreliance	30	9
It affect my writing and reading habit	70	22
Copy and paste is increasing	8	2
Others	0	0
Total	**313**	**100**

The challenges of artificial intelligent in the libraries include retrieving unfiltered information and too much information and bringing irrelevant information and also the use of artificial intelligent affect their writing and reading habit . Others indicated the problem of copy and paste; the study showed that retrieving irrelevant information from the library is the major problems while using the services in the libraries.

Table 9: Ways to Minimized the challenges of artificial intelligent for lifelong learning

Ways to improve AI in the Libraries	N	Percentage
Through seminar, workshop	170	55
Through mentoring	100	32
Use of AI should be in the curriculum	30	9

Training from time to time	13	4
Others	0	0
Total	**313**	**100**

The study suggested ways of minimizing the challenge of artificial intelligent through organizing seminar (55%) and proper mentoring by the library staff (32%) while other users recommended for the introduction of artificial intelligent in the school curriculum and others suggested for hand on training in the library. The findings shows that those that selected the use of seminars and workshop has the highest

Discussion of Findings

The study found that 263 participants were aware of the services (82 percent), while 50 participants are not aware of the services in the libraries. The findings indicated that majority of the users are aware especially the women because they paid more concentration about their education while 251)80 percent) access the artificial intelligence services within the library 43 access the services outside the library while only 19 access the services both within and outside the library. The findings shows that most of the users visit the library to access the digital services.

The findings showed that the use of artificial intelligent in research project is 49% and those that use to write assignment is 33%, and only 3% use it for research only. The study indicated that those that use artificial intelligent to write research project has the highest percentage because it retrieved information to areas whether relevant or irrelevant. The respondents indicated the ways of accessing artificial intelligent is through computers and others access through cellphone (32%) The findings indicated that majority of the users access the services through computers. On the other hand, the frequency of access by the respondents is that 90% use the services every week, and only 6% use the services every month and 4% every semester. This shows that the users were using the services every week which has the highest percentage.

The challenges of artificial intelligent in the libraries include retrieving unfiltered information and too much information and bringing irrelevant information, Moreover, the use of artificial intelligent affect their writing and reading habit while 2% indicated the problem of copy and paste. The study shows that retrieving irrelevant

information from the library is the major problems while using digital services in the libraries. This findings is similar to the study conducted by Mafara. (2024) where the author mentioned challenges of AI such as inadequate infrastructure such as reliable internet connectivity, electricity, and devices that are essential for the delivery and use of AI based educational solution. But Mah and Grob (2024) mentioned that the challenges of AI in higher education is lack of AI literacy. Therefore, adequate support services is suggested for successful and sustainable digital transformation in higher education.

The study suggested ways of minimizing the challenge of artificial intelligent through organizing seminar and proper mentoring by the library staff while other users recommended for the introduction of artificial intelligent in the school curriculum while others suggested for hand on training in the library. The findings showed that those that selected the use of seminars and workshop has the highest percentage. Slimi (2023) suggested that AI should be more extensively integrated into higher institution education curricula and that institution need to consider the ethical implications of AI in the development and implementations of their program.

Conclusion

This study investigated the application of artificial intelligence in libraries for promoting lifelong learning in higher education of Kano State. The study found that digital services in the libraries include the use of artificial intelligent, user instruction services, selective dissemination of information for lifelong learning.

Recommendations

1. Libraries should improve the function of digital services, particularly the use of artificial intelligent for lifelong learning
2. Promoting use of artificial intelligent will improve the learning outcomes of library users
3. They should devise relevant means of creating awareness about the digital services in the libraries.
4. Challenges of using digital services through proper training, workshop, seminars should be provided at all times.

Other recommendations include

1. Adequate funding of libraries by the government and their parent institution
2. Good library management
3. Provision of reliable internet and electricity facilities
4. Community support and engagement. Etc.

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